

Hydrologic Conditions in Massachusetts for December 2022

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DCR Office of Water Resources

Drought Management Task Force

January 9, 2023

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

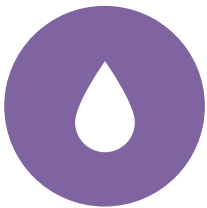
Numbers in parentheses indicate number of data points across the state



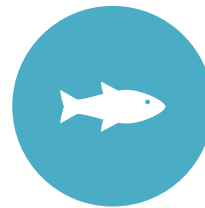
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0
4	≤2	700-800	≤-4.0

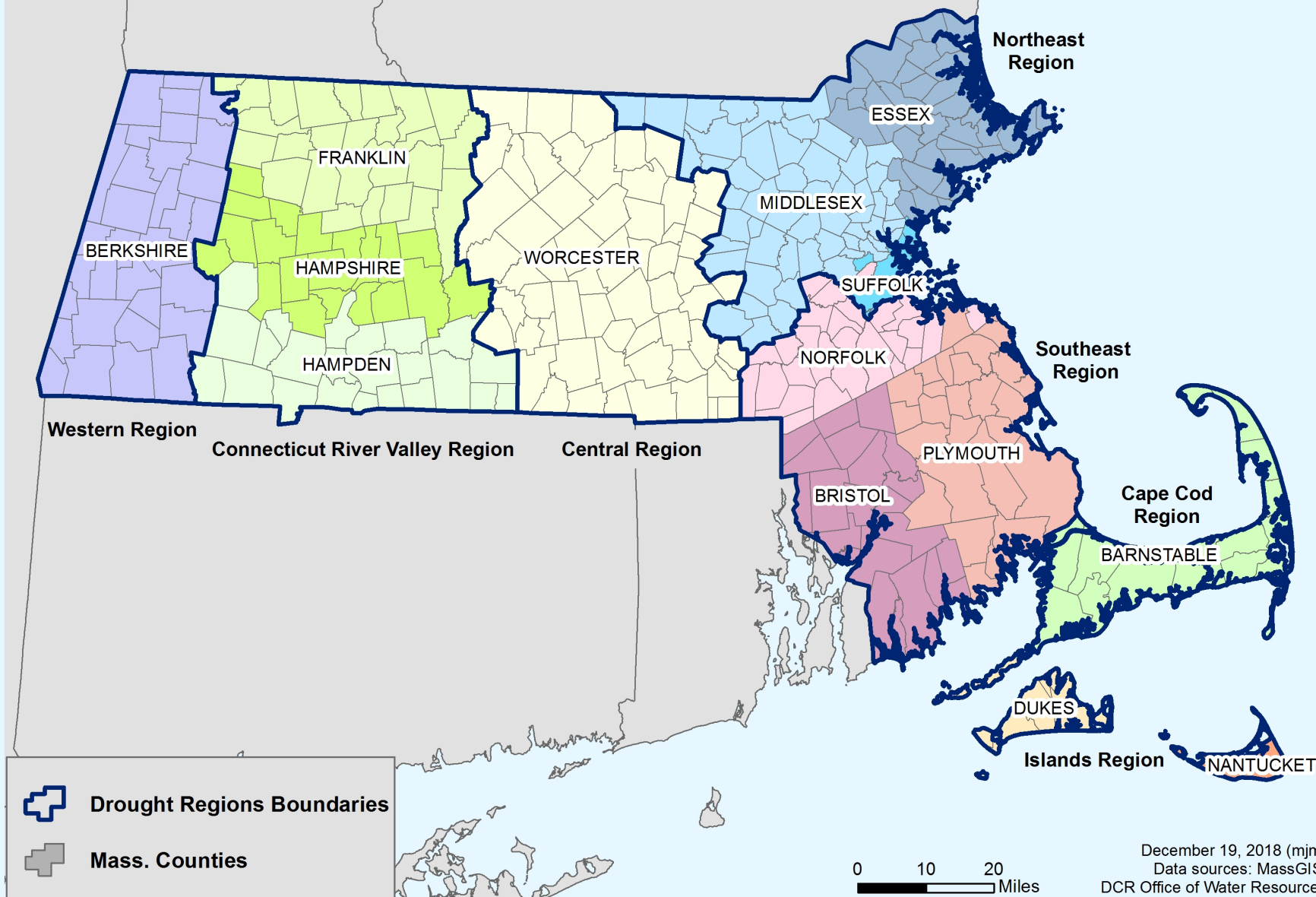
MA Drought Management Plan

Drought Levels



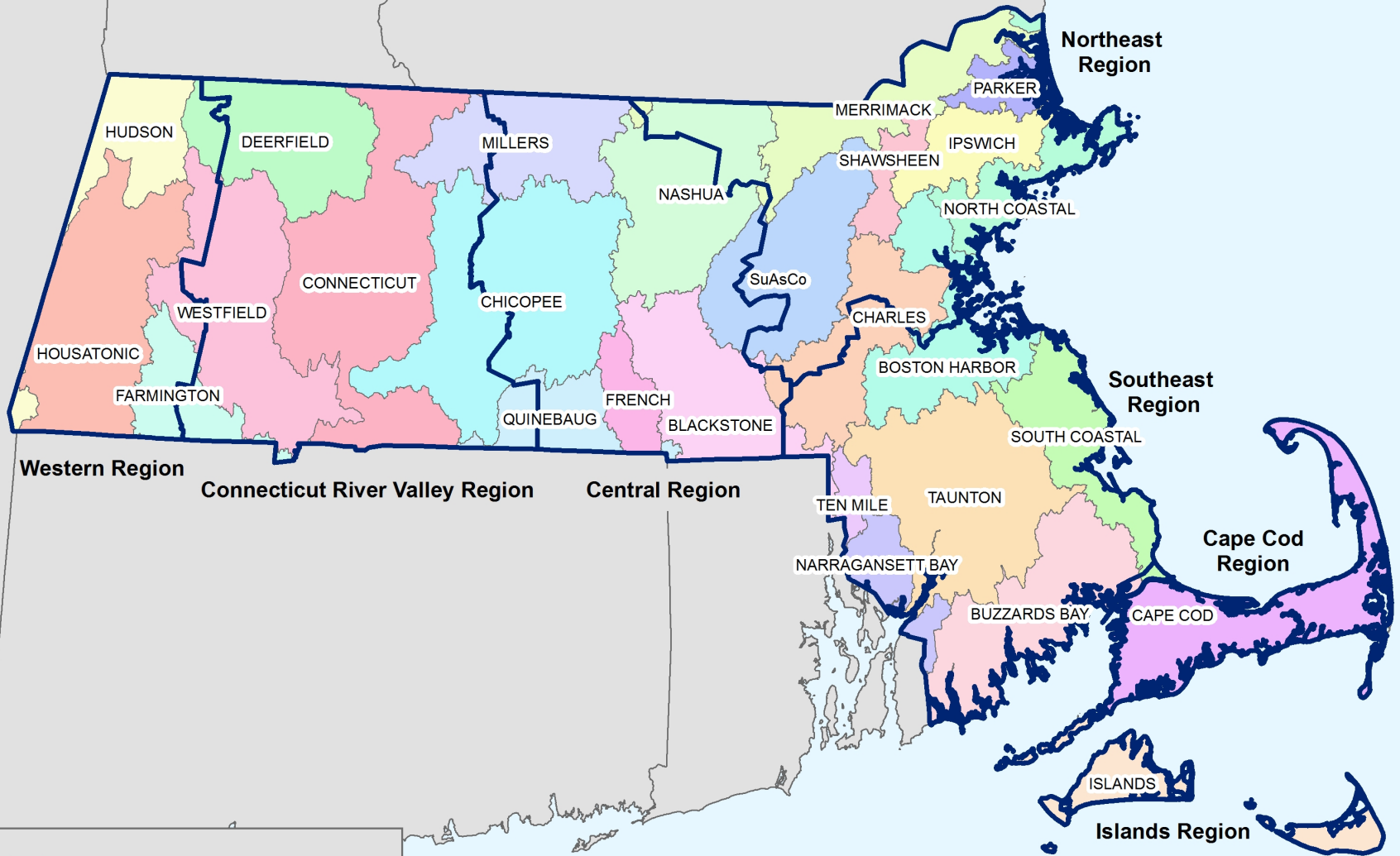


MASSACHUSETTS DROUGHT REGIONS with Counties





MASSACHUSETTS DROUGHT REGIONS with Watersheds



Drought Regions Boundaries



Mass. Counties

0 10 20
Miles

October 11, 2019 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

Task Force Member Updates



Hydrologic
Conditions



Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

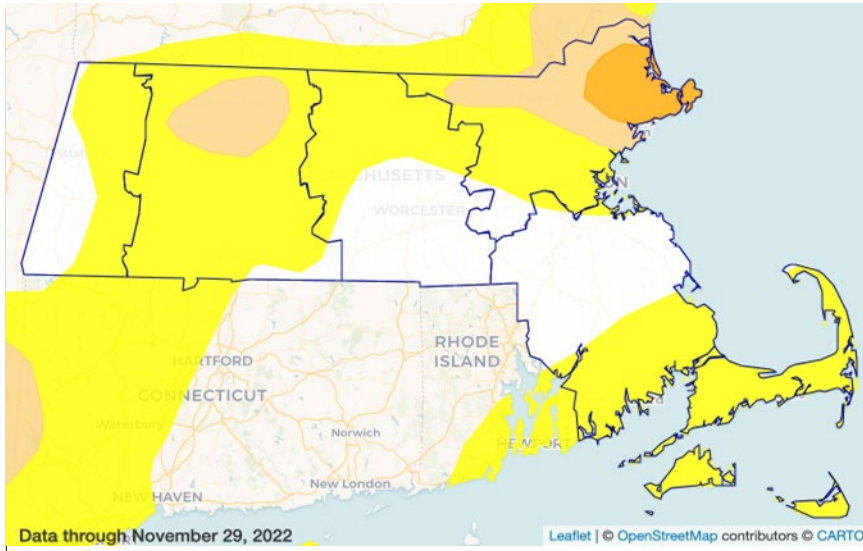


Public Health
Impacts

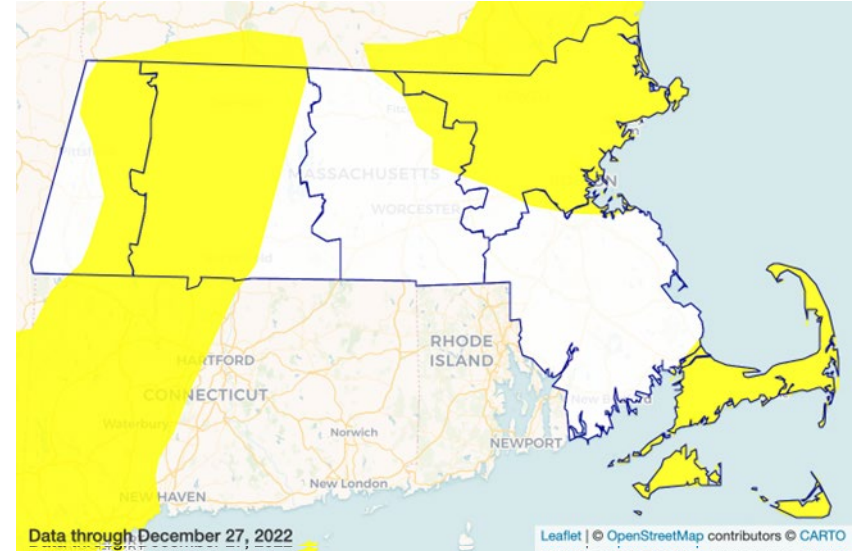
Recent Hydrologic History

- 2022
 - *April*
 - months of variable precipitation resulted in first drought call
 - *May through August*
 - minimal precipitation with high temperatures
 - storms in late August brought limited improvement to parts of the Southeast Region
 - *September & October*
 - more widespread precipitation events and improvement across the state; lingering effects especially in the Northeast and Cape Cod Regions
 - *November*
 - normal to below-normal precipitation with little to no improvement
 - *December*
 - normal to above-normal precipitation; improvement, but some areas still lagging







US Drought Monitor



Data through November 29, 2022

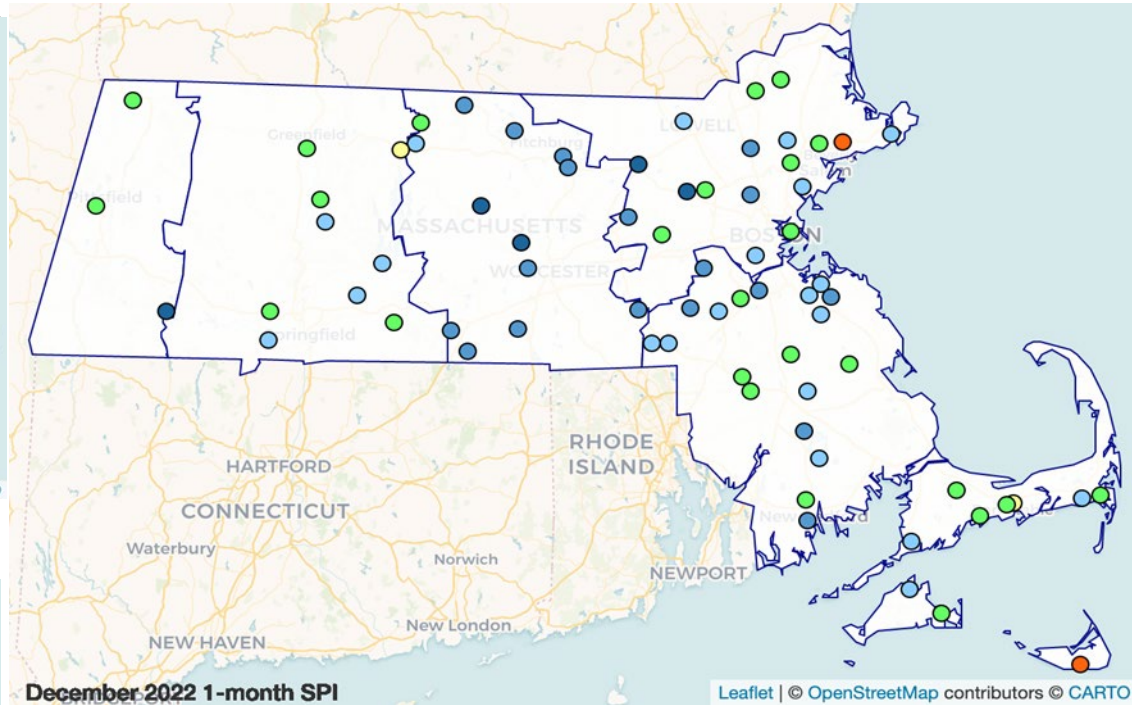
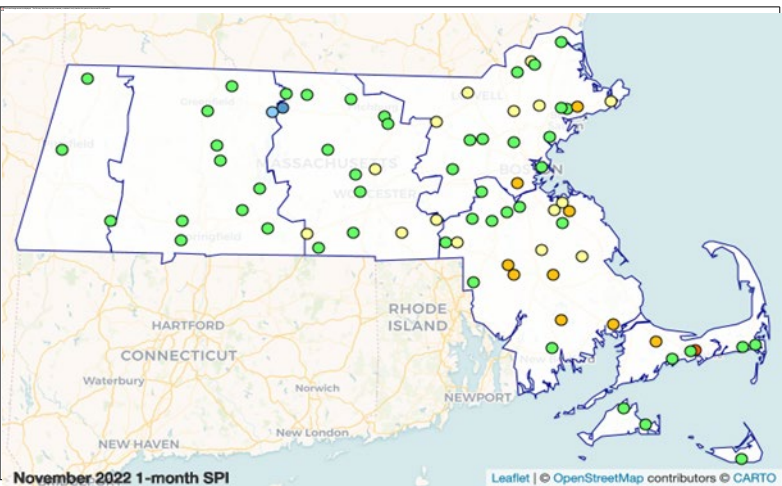
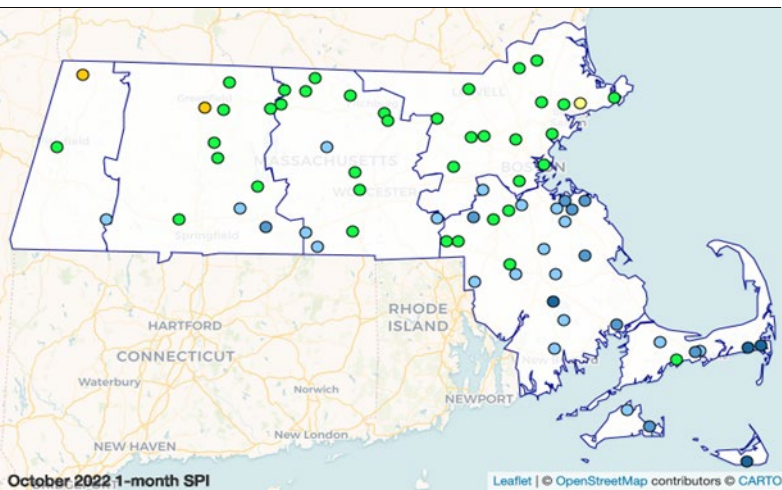


Data through December 27, 2022

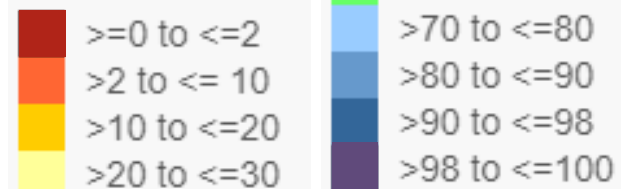
	None
	D0 (Abnormally Dry)
	D1 (Moderate Drought)
	D2 (Severe Drought)
	D3 (Extreme Drought)
	D4 (Exceptional Drought)

USDM	MA DMP
0	= 1
1	= 2
2,3	= 3
4	= 4

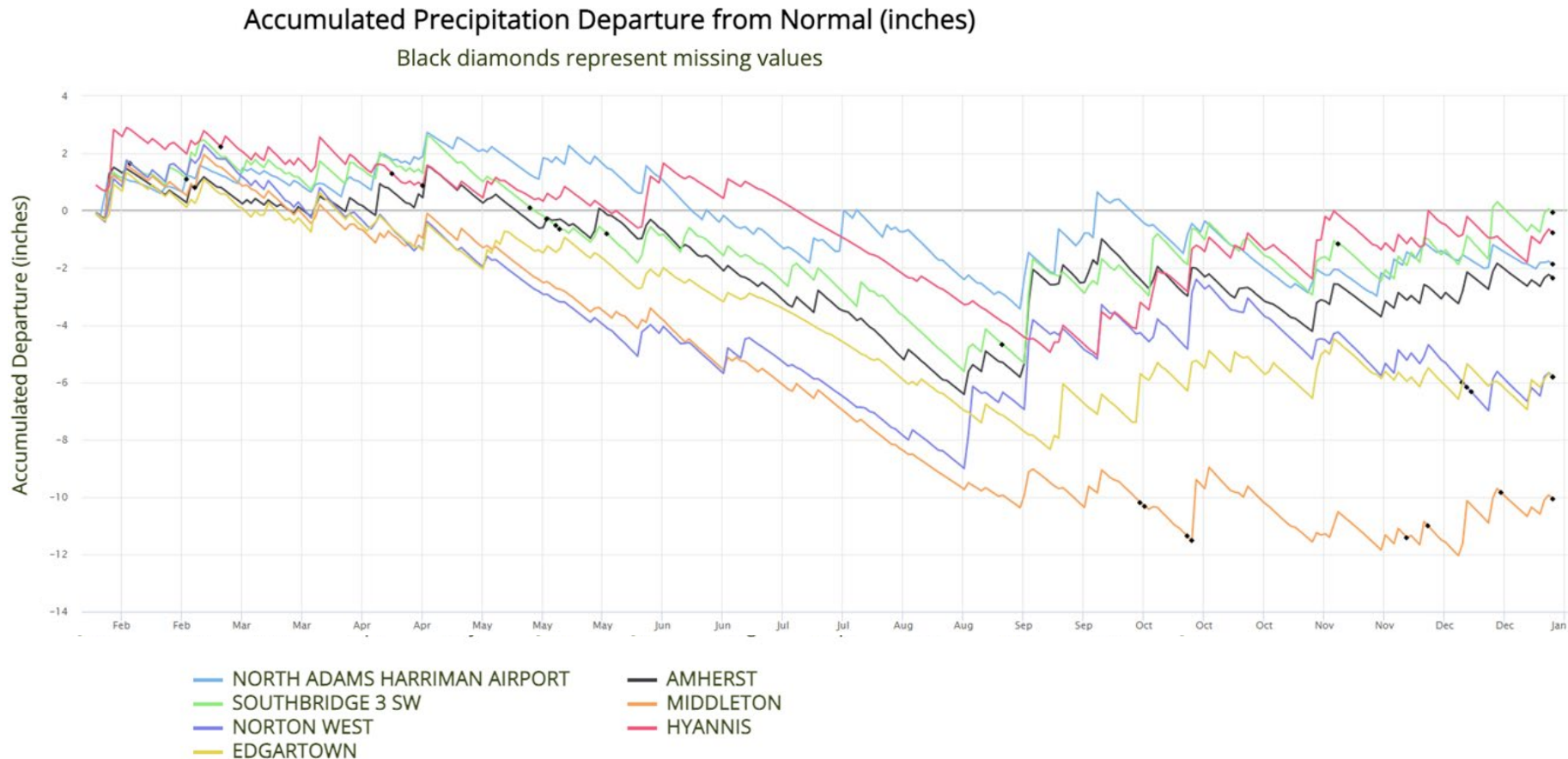
Standardized Precipitation Index



Percentiles



Accumulated Precipitation Departure from 30-Year Average in inches



- Graph does not consider starting condition's wetness/dryness
- Does not show summer heat waves with high ET
- Only 1 station per Drought Region is shown.

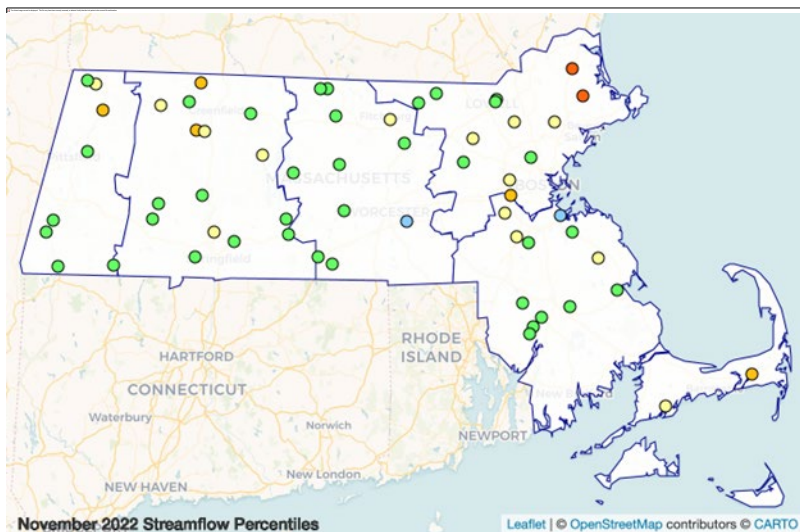
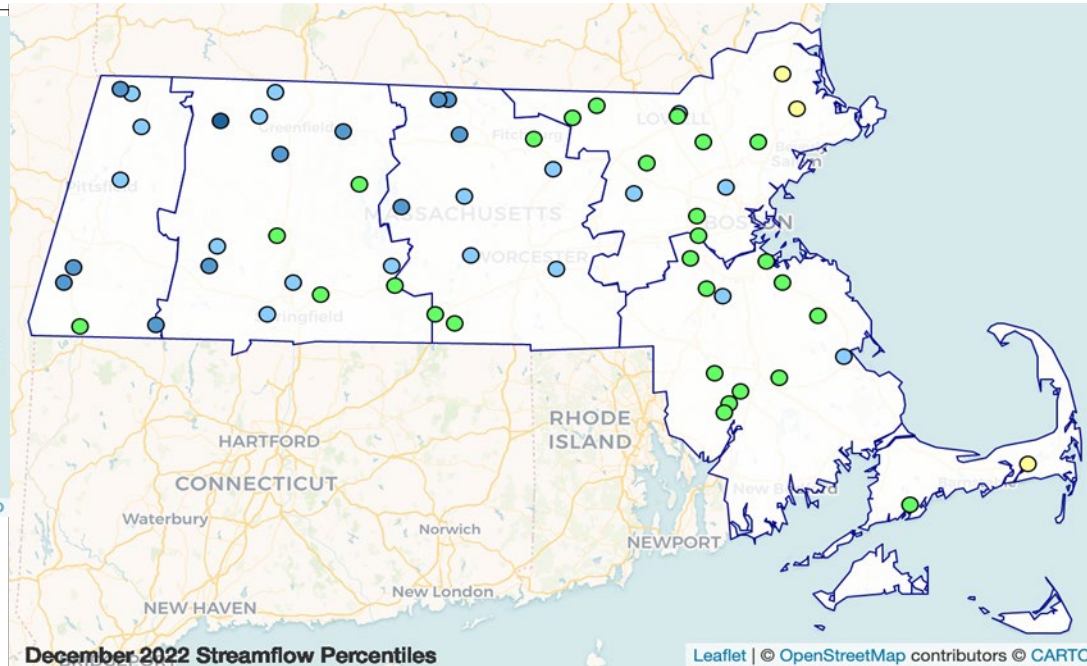
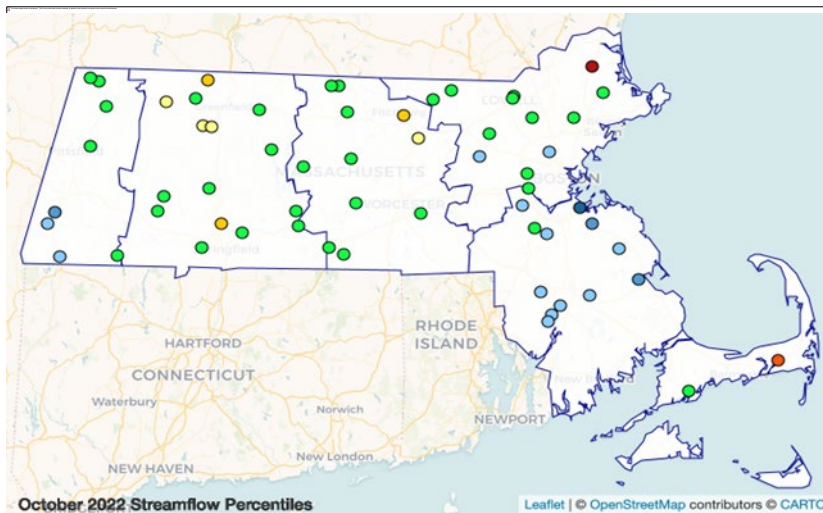
Standardized Precipitation Index as Percentile, December

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	4	16	26	38	58	74	43	83	70
CTRV	10	40	49	56	75	78	51	76	69
CENTRAL	14	50	46	55	82	85	61	87	77
NORTHEAST	20	45	47	58	76	60	32	67	73
SOUTHEAST	19	51	34	46	65	68	55	71	61
CAPE COD	4	31	27	25	81	85	69	73	27
ISLANDS	2	37	21	20	56	61	44	22	10

* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Streamflow Percentiles of Monthly Median

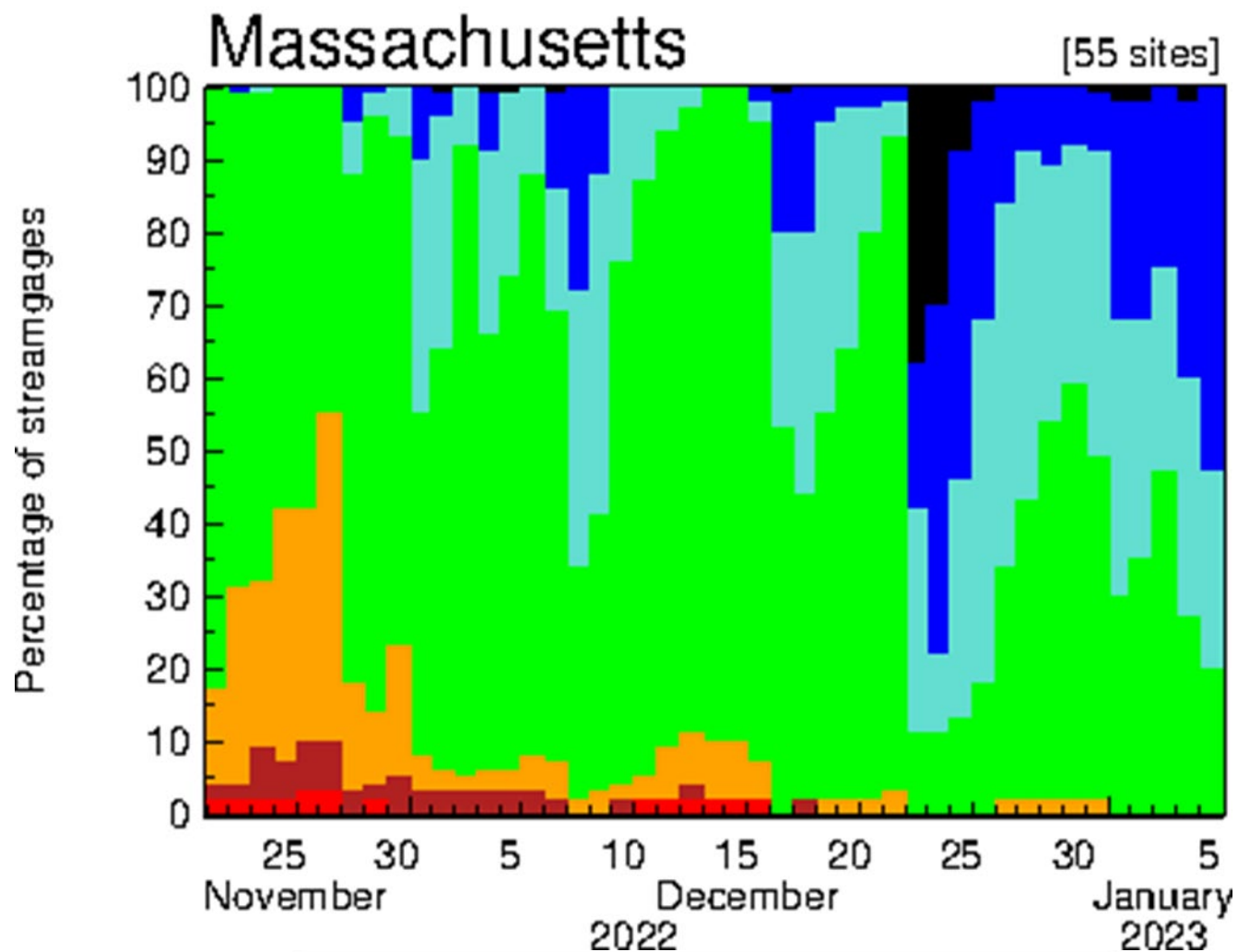


Percentiles

>=0 to <=2
>2 to <= 10
>10 to <=20
>20 to <=30

>30 to <=70
>70 to <=80
>80 to <=90
>90 to <=98
>98 to <=100

Percent of Gages at Various Percentiles



Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	No Data

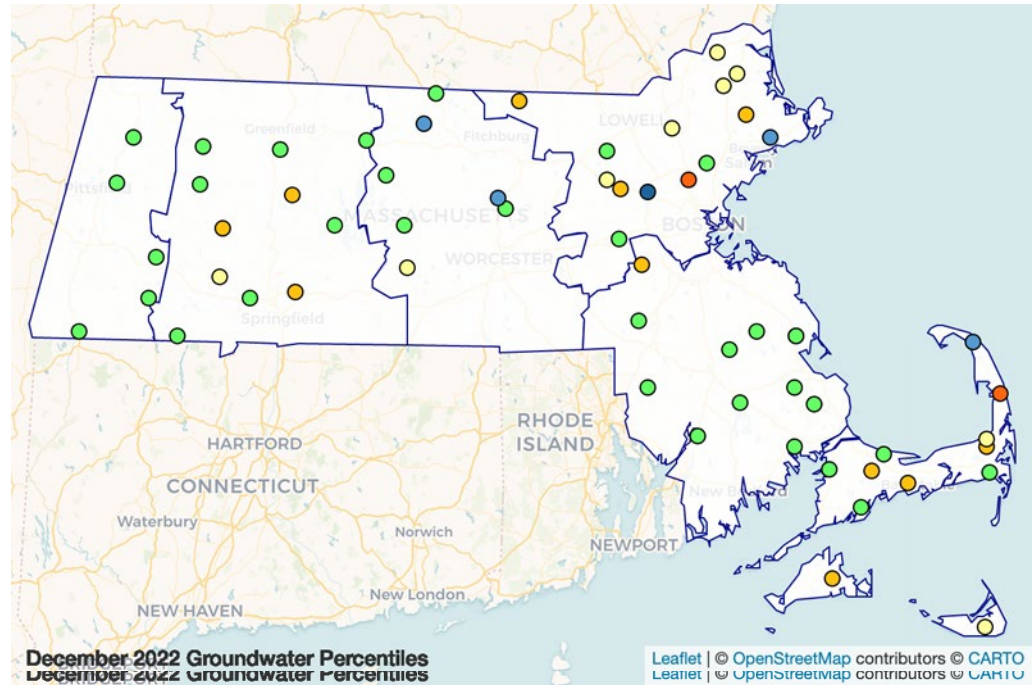
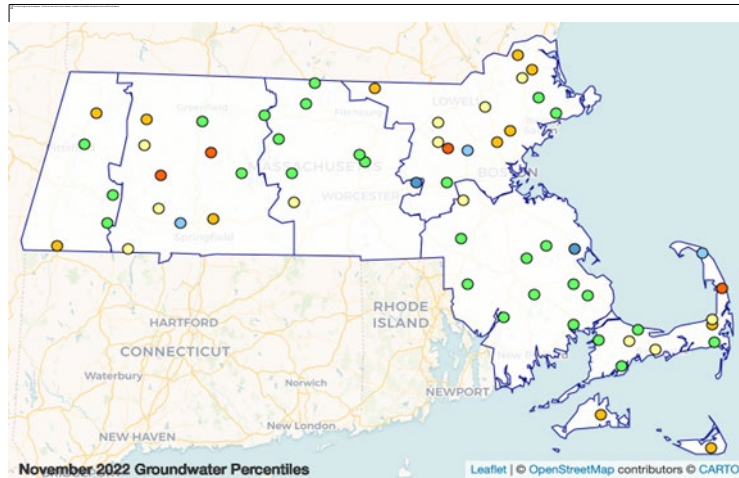
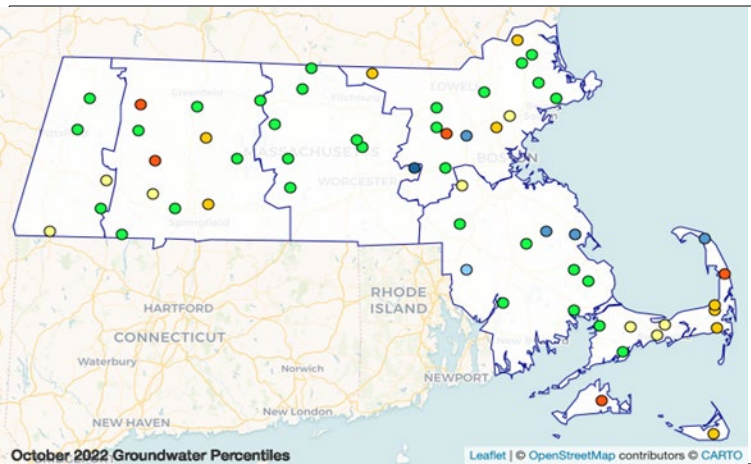
Streamflow Index December

REGION	NUMBER OF GAGES REPORTING	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	3	2	0	26
CTRV	15	0	0	0	5	0	33
CENTRAL	11	0	0	1	2	0	36
NORTHEAST	13	0	0	0	1	0	45
SOUTHEAST	12	0	0	1	4	0	35
CAPE COD	2	0	0	2	0	0	15

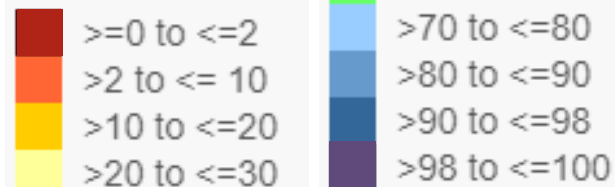
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Groundwater Percentiles



Percentiles



Groundwater Index

REGION	NUMBER OF WELLS REPORTING	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES
WESTERN	5	0	0	0	0	0	46
CTRV	11	0	0	3	1	0	42
CENTRAL	7	0	0	0	1	0	68
NORTHEAST	14	0	1	3	5	1	27
SOUTHEAST	12	0	0	1	0	1	52
CAPE COD	10	0	1	3	1	0	28
ISLANDS	2	0	0	1	1	0	16

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	100%
CTRV	2	70th
CENTRAL	6	64th
NORTHEAST	4	35th
SOUTHEAST	2	52nd
CAPE COD	1	16th

Notes:

DMP index severity levels do not necessarily reflect water supply status.

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Drought Indices by Region, November 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (9 mos)	37	36	30	7	18	17	30
Streamflow	42	33	49	31	37	14	N/A
Groundwater	50	24	53	22	46	25	14
Lakes/ Impoundments	35	17	45	15	35	15	N/A
ET- CMI EDDI	Level 0 3	Level 0 2	Level 0 2	Level 0 2	Level 0 1	Level 0 0	Level 0 0
KBDI	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0

<i>Declaration from (12/7 meeting)</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 0</i>	<i>Level 2</i>	<i>Level 0</i>	<i>Level 2</i>	<i>Level 2</i>
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Lakes & Impoundments Index does not reflect water supply status. This summary is provided for informational purposes. No changes in drought status are official until the Secretary of the Executive Office of Energy and Environmental Affairs makes the final drought declaration for the state after receiving a recommendation from the Drought Management Task Force. Data are preliminary and not final until all data are reported. N/A = not applicable. ID = insufficient data.

Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Drought Indices by Region, December 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (9 mos)	34	34	44	14	30	22	25
Streamflow	80	76	75	50	65	29	N/A
Groundwater	46	42	68	27	52	28	16
Lakes/ Impoundments	72	34	30	24	79	17	N/A
ET*- CMI EDDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
KBDI**	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Recommend for (1/9 meeting)	Level 0	Level 0	Level 0	Level 1	Level 0	Level 1	Level 2
Declaration from 12/7 meeting	Level 0	Level 1	Level 0	Level 2	Level 0	Level 2	Level 2

Lakes & Impoundments Index does not reflect water supply status. This summary is provided for informational purposes. No changes in drought status are official until the Secretary of the Executive Office of Energy and Environmental Affairs makes the final drought declaration for the state after receiving a recommendation from the Drought Management Task Force. Data are preliminary and not final until all data are reported. N/A = not applicable. ID = insufficient data.*ET not reported outside growing season **KBDI not reported Dec-March outside fire danger season

Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Drought Indices by Region

November

December

West	CTRV	Central	NE	SE	Cape	Islands	Drought Index	West	CTRV	Central	NE	SE	Cape	Islands
37	36	30	7	18	17	30	Precip*	34	34	44	14	30	22	25
42	33	49	31	37	14	N/A	Stream flow	80	76	75	50	65	29	N/A
50	24	53	22	46	25	14	Ground water	46	42	68	27	52	28	16
35	17	45	15	35	15	N/A	Lakes/ Impoundments	72	34	30	24	79	17	N/A
Level 0 3	Level 0 2	Level 0 2	Level 0 2	Level 0 1	Level 0 0	Level 0 0	ET- CMI EDDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0	KBDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Level 0	Level 1	Level 0	Level 2	Level 0	Level 2	Level 2	<i>Rec for (1/9 mtg)</i>	Level 0	Level 0	Level 0	Level 1	Level 0	Level 1	Level 2

* November = 9 mos

* December = 9 mos